

MULTIMEDIA



UNIVERSITY

STUDENT IDENTIFICATION NO

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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

TRIMESTER 2, 2017/2018

**BBM3034 – BUSINESS MODELLING AND SIMULATION**  
(All section/Group)

2 MARCH 2018  
3.00 p.m. – 5.00 p.m.  
(2 hours)

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### INSTRUCTION TO STUDENT

1. This question paper consists of **FIVE (5)** pages, excluding the cover page, of **FOUR (4)** structured questions.
2. Marks are shown at the end of each question.
3. Set up Question 2's production model in Worksheet 1. **Attach your answer in Worksheet 1 to the answer booklet.**
4. Write all your answers in the answer booklet provided.

Answer all questions.

**Question One**

- (a) Briefly define a simulation model. (9 marks)
- (b) Discuss why model verification is important in modelling and simulation? (4 marks)
- (c) The key aspect of solving real business problems is dealing appropriately with uncertainty. How do you model uncertainty of the demand of the new third generation of Perodua Myvi in 2018? (12 marks)

(Total: 25 marks)

**Question Two**

Read the problem below and answer the following questions.

ComCorp is a company that produces wireless mouse, namely T1 and T2, respectively. The unit price for T1 is RM25 and T2 is RM30. ComCorp estimated its monthly demand from the [www.lazada.com.my](http://www.lazada.com.my) market for T1 and T2 are 300 units and 220 units, respectively. ComCorp's operation manager informs you that in any typical month, it requires 5 units of materials to produce T1 and another 5 units to make T2 for the [www.lazada.com.my](http://www.lazada.com.my) market. Each unit of materials costs RM1 and the funds available to buy materials for production to meet [www.lazada.com.my](http://www.lazada.com.my) market is RM2,500 per month.

The labour cost to produce T1 requires 6 labour hours of assembling, quality checking and packaging. The labour cost to produce T2 requires 9 labour hours of assembling, quality checking and packaging. The labour cost of assembling, quality checking and packaging is RM2 an hour. The amount of monthly labour hours available for ComCorp to produce the wireless mouse is 3,000 hours for assembling, quality checking and packaging. Assuming that ComCorp does not hold any inventory, it wants to know how to optimise its production and maximise its profits by selling its wireless mouse online at lazada.

Based on the problem above, answer the following questions:-

- (a) State the mathematical objective function of this problem. (3 marks)
- (b) State four constraints to this problem. (8 marks)
- (c) What is the material and labour cost for the production of one unit of T1? T2? (6 marks)
- (d) If the optimum solution is to produce 300 units of T1 and 133 units of T2, set up the problem on **Worksheet 1** (in page 5). In Worksheet 1, determine the total material used, total labour cost and the total profits for the production of T1 and T2. **Attach Worksheet 1 to your answer booklet.** (8 marks)

(Total: 25 marks)

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**Question Three**

In the beginning of year 2014, Advance Tech, an investment company, has RM30 million to invest for the next four years. There are four possible investments labelled A through D. The timing of cash outflows and cash inflows for these investments is somewhat irregular. For instance, to take part in Investment A, cash must be invested at the beginning of 2014 and for every ringgit invested, there are returns of RM0.50 and RM1.00 at the beginnings of 2015 and 2016.

For every ringgit invested in Investment B at the beginning of 2015 will receive returns of RM0.50 and RM1.00 at the beginnings of 2016 and 2017. For every ringgit invested in Investment C at the beginning of 2014 will receive returns of RM1.20 at the beginning of 2015. For every ringgit invested in Investment D at the beginning of 2017 will receive returns of RM1.90 at the beginning of 2018. Advance Tech has limited RM20 million to be invested in any of the investments.

Advance Tech's objective is to maximise the amount of cash at the beginning of year 2018. At the beginning of any year, the company can only invest the cash on hand, which includes returns from previous investments. Any cash not invested in any year can be put in a short-term money market account that earns 3% annually.

**Worksheet 2** illustrates the set up for Advance Tech's financial investment strategy.

Based on these information and Worksheet 2, answer the following questions.

- (a) How much and in which year did Advance Tech invest in Investment A, B, C and D? (4 marks)
- (b) Compute Advance Tech's returns from investment from 2015 to 2018. (8 marks)
- (c) Calculate Advance Tech's cash after investment for 2016 and 2017. (4 marks)
- (d) Compute Advance Tech's final cash at the beginning of 2018. (9 marks)

(Total: 25 marks)

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**Worksheet 2 : Financial Investment**

	A	B	C	D	E	F	G
1	Initial amount to invest	RM30,000,000					
2	Maximum per investment	RM20,000,000					
3	Interest rate on cash	3%					
4							
5	Cash outlays on investments (all incurred at beginning of year)						
6	Year	Investment A	Investment B	Investment C	Investment D		
7	2014	RM1.00	RM-	RM1.00	RM-		
8	2015	RM-	RM1.00	RM-	RM-		
9	2016	RM-	RM-	RM-	RM-		
10	2017	RM-	RM-	RM-	RM1.00		
11							
12	Cash returns from investments (all incurred at beginning of year)						
13	Year	Investment A	Investment B	Investment C	Investment D		
14	2014	RM-	RM-	RM-	RM-		
15	2015	RM0.50	RM-	RM1.20	RM-		
16	2016	RM1.00	RM0.50	RM-	RM-		
17	2017	RM-	RM1.00	RM-	RM-		
18	2018	RM-	RM-	RM-	RM1.90		
19							
20	RM invested	RM20,000,000	RM20,000,000	RM10,000,000	RM20,000,000		
21		<=	<=	<=	<=		
22	Maximum per investment	RM20,000,000	RM20,000,000	RM20,000,000	RM20,000,000		
23							
24	Constraints on cash balance						
25	Year	Beginning cash	Returns from investments	Cash invested	Cash after investing		
26	2014	RM30,000,000	RM0	RM30,000,000	RM0	>=	0
27	2015	RM0	(b)	RM20,000,000	RM2,000,000	>=	0
28	2016	?	(b)	RM0	(c)	>=	0
29	2017	?	(b)	RM20,000,000	(c)	>=	0
30	2018	?	(b)				
31							
32	Final Cash	(d)					

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### Question Four

Moana ran a quick simulation on the annual returns of Tropicana Corp stock. Tropicana Corp's stock return depends greatly on Malaysia's economic environment, with the probability of 25% high growth, 60% moderate growth and 15% low growth. Initial cash to be invested is RM20,000, with annual additional investment of RM5,000. Table 1 is the probability distribution of Tropicana Corp's return based on each type of economics environment. Table 2 is the 10 years simulated annual return model for Tropicana Corp stock. Assume that the probability of an event to occur is normally distributed.

<b>Table 1: Cumulative Probability of Annual Return</b>					
Cummulative Return Proabability	High growth Rate of Return	Cummulative Return Proabability	Moderate growth Rate of Return	Cummulative Return Proabability	Low growth Rate of Return
0.05	12%		0.10	12%	0.55
0.10	18%		0.15	18%	0.65
0.20	20%		0.30	20%	0.75
0.30	25%		0.60	25%	0.85
0.40	30%		0.85	30%	0.90
0.55	35%		0.90	35%	0.95

<b>Table 2: Simulated Annual Return</b>			Type of Economic Environment	Annual Rate of Return	
Year	Beginning Cash	Probability			Ending cash
1	RM 20,000	0.4577	Moderate	20%	24,000.00
2	29,000.00	0.7667	Moderate	25%	36,250.00
3	41,250.00	0.9864	Low	35%	55,687.50
4	60,687.50	0.7925	Moderate	25%	75,859.38
5	80,859.38	0.8015	Moderate	25%	101,074.22
6	(b)	0.1363	(a)	(a)	(b)
7	(b)	0.7370	(a)	(a)	(b)
8	(b)	0.4955	(a)	(a)	(b)
9	(b)	0.5214	(a)	(a)	(b)
10	(b)	0.4863	(a)	(a)	(b)

Based on all the information provided, answer the following questions.

- (a) Determine the types of economic environment and the annual rate of return for Year 6 onwards. (5 marks)
- (b) Based on your answers in (a), compute the Beginning Cash and Ending Cash for Year 6 onwards. (10 marks)
- (c) Based on this simulated model, should you invest in Tropicana Corp stock? Explain. (4 marks)
- (d) Comment on this simulated investment model. (6 marks)

(Total: 25 marks)

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Student ID No :-

Worksheet 1

	A	B	C	D	E	F
1						
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